SR 900

DUVALL AVENUE TO SR 90

ROUTE DEVELOPMENT PLAN

Submitted To:

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DISTRICT 1

Prepared By:

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EXECUTIVE SUMMARY

Introduction

This Route Development Plan was prepared for a 7-mile section of State Route (SR) 900 in King County. The study section extends from Duvall Avenue in Renton (milepost 14.2) to Gilman Boulevard in Issaquah (milepost 21.4). A Route Development Plan is a process which examines the existing function of a state route and evaluates how the route can be developed to best serve as part of the state highway network. This report recommends that SR 900 be widened and improved to current design standards.

Existing Conditions

SR 900 is currently a two-lane, 40 mph (speed limit was reduced from 50 mph in winter 1992) facility without access control. The route is functionally classified as a Minor Arterial and Washington State Department of Transportation's (WSDOT) *Level of Development Plan* lists SR 900 as eventually being improved to 3-R standard (resurfacing, restoration, and rehabilitation) for this classification. SR 900's primary use is consistent with the roadway's classification as a Minor Arterial. The route, in conjunction with Principal Arterials, serves regional level trips and forms part of a connecting network of rural arterials which extends through urban areas (Issaquah and Renton). SR 900 is additionally classified by WSDOT as a Class IV bikeway. Class IV bikeways are facilities where bicycles use the roadway.

The original SR 900 roadway was added to the state highway system in 1909 and much of the alignment does not conform with current design standards. With the exception of short sections of the route in Issaquah and Renton, the route travels through areas which are sparsely developed and rural in character. The majority of the intersections on the route are controlled by stop signs.

Traffic on the route ranges from 7,000 average annual daily traffic (AADT) in the rural sections to 12,000 to 18,000 AADT in the urban sections on each end of the study area. The roadway currently operates at LOS C to D during the evening peak hour with little additional capacity for additional traffic growth. Transit, bicycle, and pedestrian use of the roadway is generally low, although pedestrians are frequently found walking on the roadway shoulders.

The accident rates on SR 900 are double the statewide average for similar roadways. The most common type of accidents involve only one vehicle. Two intersections on SR 900 are High Accident Locations (HAL): SR 900/164th Ave. SE and SR 900/Mall Street-Gilman Boulevard.

Most of the SR 900 study route is located in unincorporated King County. Property along the highway is largely subject to King County plans, policies and land use regulations with some additional regulations by the Cities of Issaquah and Renton. Potential development in the study area include several master-planned villages.

Route Development

The combination of traffic growth and the non-standard roadway geometry on SR 900 contribute to an accident rate far above the average for the state. Improvements to SR 900 are justified to improve current corridor safety and to increase capacity to serve the traffic growth expected in the future.

Over the next 20 years, widening of SR 900 to four lanes per 3-R standards for Minor Arterials is justified given the future role of SR 900 as an increasingly important road in the rural arterial network, a connector between growing urban areas (per Puget Sound Regional Council's Vision 2020) and increased use as a commuter route.

It is recommended that SR 900 be widened to four lanes. Sidewalk and a 5-foot bike lane would be constructed on each side of the roadway in two locations: the urban portion of the route east of Renton, and a section near 164th Avenue SE where the housing and commercial density is higher than other locations in the corridor. These sections would function as a Class II bicycle facility since the lane would be marked. An eight to ten-foot shoulder on each side of the roadway would be provided at locations along the route without a sidewalk, to function as a Class IV bikeway.

The route has a number of areas which are environmentally sensitive and may influence the development plan. The areas include flood hazards along May and Tibbetts Creek, steep slopes, and extensive wetlands along much of the route.

The proposed development would be constructable. Maintaining acceptable traffic operations will be difficult in a few areas due to the restrictions imposed by blasting of bedrock during construction. However, the remainder of the project would be constructed with traffic restrictions and delays typical of a project of this size.

SECTION 1 - ROUTE LOCATION

1.1 Introduction

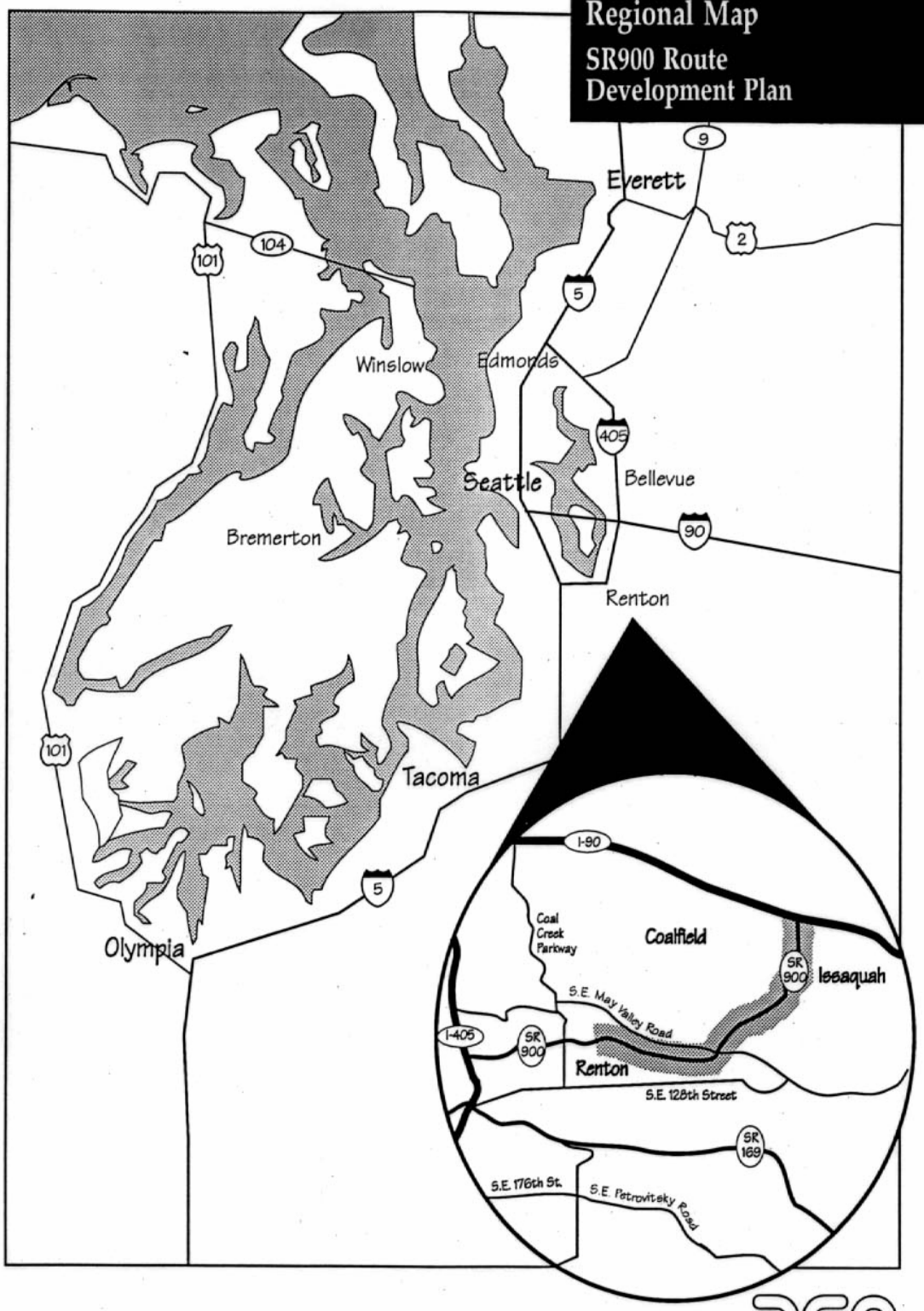
This report presents the findings of a Route Development Plan prepared for a 7-mile section of SR 900 between the Cities of Renton and Issaquah in King County. A Route Development Plan (RDP) is a process which examines the existing function of a state route and evaluates how the route can be developed to best serve as part of the state highway network.

A Route Development Plan is intended to identify the improvements needed for a designated section of State Highway to accommodate safety and capacity requirements at a future date - usually 20 years hence. The plan includes a number of factors which are evaluated and synthesized into a recommended highway plan. When approved, the plan will provide:

- Guidance for prioritization of the District's future plans,
- Direction for the determination of impact mitigation measures for proposed developments,
- Input into the state-wide budgetary process, and
- Coordination with local jurisdictions for growth management planning.

The study portion of SR 900 extends from milepost (MP) 14.20 to MP 21.40. Figure 1 shows the location of SR 900 with respect to the interstate system. Figure 2 shows the portion of SR 900 reviewed in this plan. SR 900 is currently a two-lane facility with a posted speed limit of 40 mph and is classified as a Minor Arterial by WSDOT.

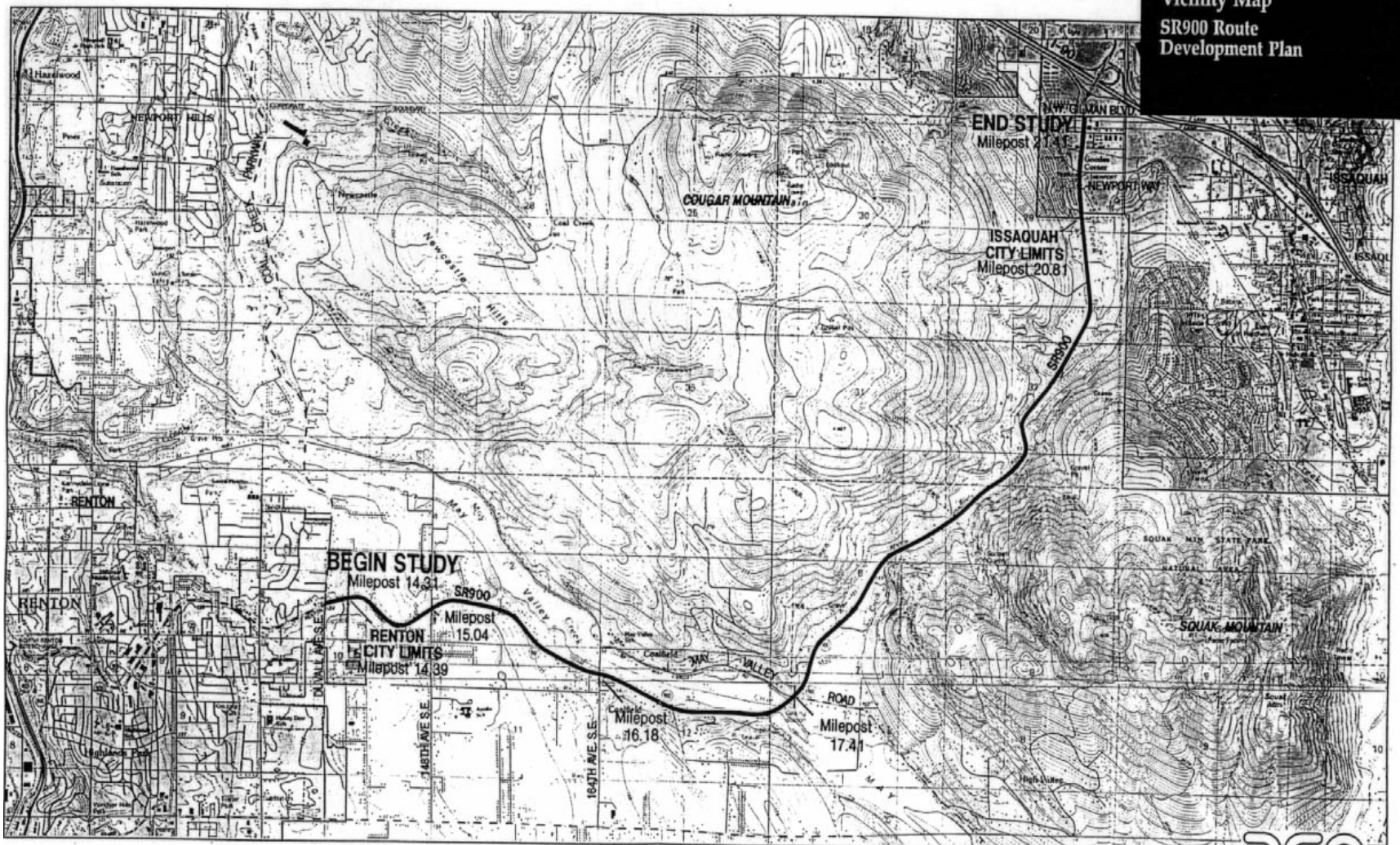
FIGURE 1
Regional Map
SR900 Route Development Plan



SR 900
Route Development Plan

DAVID EVANS AND ASSOCIATES, INC.

FIGURE 2
Vicinity Map
SR900 Route Development Plan



SECTION 2. PURPOSE AND FUNCTION

2.1 Route Purpose

SR 900 primarily serves as a regional connection between the east-central urbanized portion of King County and the City of Renton and areas to the south of Renton. SR 900 is the most direct route from the Bellevue, Issaquah, and East Lake Sammamish areas to Renton and the Green River Valley. SR 900 is used as - a commute route between these areas. The use of the route has increased as traffic in the region has increased and as the cities on each end of the route have grown. The route also carries increasing commuter traffic generated by drivers avoiding the I-405 and I-90 corridors, although this traffic makes up a very small proportion of the current flow.

As a secondary function, SR 900 is used by local area residents as a link to I-90, I-405 and the Cities of Issaquah and Renton. Because the King County road network around the rural section of SR 900 is relatively sparse, SR 900 carries most of the local traffic generated by people who live or work along the route in unincorporated King County.

In addition to use by regional commuters and residents of the area, SR 900 has a limited function as a route for commercial and recreational traffic. Commercial trips are generated by several quarries in the middle section of the route, a few businesses around 164th Avenue SE and by a number of businesses in the urban areas at each end of the route. Recreational trips are generated by travel to the hiking trails and large parks in the area.

2.2 Functional Classification

The study section of SR 900 is identified as a Minor Arterial in the WSDOT Functional Classification Plan. Based on WSDOT's classification standards (WSDOT *Design Manual*, Section 440), a Minor Arterial, in conjunction with the Principal Arterial system, forms a rural network of arterial routes linking cities, which generate long distance travel, with road extensions into and through urban areas. This function forms an integrated network providing interstate and inter-regional travel.

The existing use of SR 900 is consistent with the design manual characteristics for a Minor Arterial because it is a part of a rural network of arterials with extensions linking urban areas. Other state principal and minor arterials which connect directly or indirectly to SR 900 include SR 18, SR 169, SR 203, SR 202 and SR 901. These state highways form a network of arterials which serve the rural, less developed areas of King County. SR 900, as characterized in the design standards for a Minor Arterial, also extends into and connects urban areas (the Cities of Renton and Issaquah).

A Minor Arterial, as noted in the classification standards, also forms an integrated network providing major interstate and inter-regional service. SR 900 fits this description by providing a link to two major interstate routes: I-90 and I-405.

2.3 Access Control

The study route is not access controlled or classified. The route is intersected by a number of county roads and private driveways. WSDOT will soon assign access management classifications to all state routes, including SR 900.

Currently there is no access control along SR 900 except in the vicinity of SR 90 in Issaquah-SR 900 is fully access controlled at the I-90 interchange (from MP 21.42 to MP 21.64). Most parcels adjacent to SR 900 have no alternative access to adjacent roads. As the road is widened and improved, access revisions should attempt to eliminate or consolidate access points. During future design activities the following access control measures should be addressed:

- Elimination of access where alternative access is available.
- Consolidation of access (adjacent parcels sharing access points).
- Frontage road access to consolidate access.
- New development should be required to consolidate access at a single point.

2.4 Level of Development Plan

A Level of Development (LOD) is designated for each state highway. Decisions on the need for and design of projects is, at least partially, based on this LOD designation. There are three levels:

- Maintain Structural Integrity and Operational Safety,
- (Resurfacing, Restoration, and Rehabilitation), and
- Design Standard.

The study section of SR 900 is designated for improvement to 3-R standards (*WSDOT Design Manual*, Section 430). This level of improvement primarily involves work on the existing roadway and/or subsurface. The intent of a 3-R project is to preserve or improve the existing geometrics of the roadway section.

SECTION 3. DESCRIPTION OF EXISTING FACILITIES

3.1 History of Facility

SR 900 was originally one of the highways called Primary State Highway 2 (PSH 2) which was added to the state highway system in 1909. At that time, and for a long time after, this road section was also known as The Sunset Highway. In 1970, the state legislature renumbered the state highway system and relabeled the section of PSH 2 from I-405 to I-90 as SR 900 (reference RCW 47.17.825). This highway is still locally called the Sunset Highway, and the SR 900/I-405 interchange is called the Sunset Interchange. Table 1 contains a listing of contracts which have maintained and/or improved the safety of the route since 1971.

Table 1

SR 900 Contract History

Project Title	Type of Construction	Work Began	Date Complete	Final Est. Amt.	Prime Contractor	Project Engineer
Renton ECL to SE May Valley	Crack Seal/ Preleveling/pav	07/06/83	09/01/83	$256,506.39	Hi-Line Asphalt	Carter
May Creek	Drainage	07/02/76	08/25/76	$37,002.10	Watson Asphalt Pav	Patrick
SE May Valley Road to Issaquah	Improvement of SR 900	06/28/82	08/20/82	$305,789.92	Lakeside Industries	Arwine
Issaquah Vicinity	Resurfacing Asphalt	09/16/71	10/07/71	$35,471.59	Washington Asphalt	Till
Tibbetts Creek Bridge	Guardrail, illum, Signal	06/26/75	12/11/75	$141,505.43	Dale M. Madden	Greenwood
Lake Sammamish to E. Issaquah	Signing, illum	03/31/69	10/21/71	$5,007,770.19	Fiorito Brothers	Berg
Gilman Blvd. & Newport Way Signals	Install Signal Systems	09/17/85	06104186	$156,538.12	Knobel's Electric	Carter

3.2 Roadway Description

At the southwest end of the route at Duvall Avenue in Renton, SR 900 is located in an urban area characterized by commercial and some multi-family development transitioning to single family development to the east. The existing roadway at Duvall Avenue consists of a five-lane section with two 11 foot lanes in each direction, and an 11 foot center two-way left-turn lane.

This roadway section also contains a vertical curb, gutter and sidewalk on both sides. This five-lane section ends just east of 142nd Avenue SE and transitions to a two-lane section with two 11-foot lanes and with shoulders that vary from 2 to 6 feet. North of Newport Way, the roadway section widens to five lanes with two 11-foot lanes in each direction and a 12-foot wide center two-way left-turn lane and 10 foot shoulders.

Existing Right-of-Way

The following table presents the existing right-of-way widths along the project alignment.

Table 2

SR 900 Existing Right-of-Way Widths

From	To	R/W Width (feet)
Duvall Avenue SE	142nd Avenue SE	varies 90 to 110
142nd Avenue SE	162nd Avenue	60
162nd Avenue SE	164th Avenue SE	80
164th Avenue SE	Newport Way	60
Newport Way	Gilman Blvd.	200

Posted Speed

The posted speed limit is 40 mph. The speed limit was reduced from 50 mph to 40 mph on the section east of 142nd SE to the Issaquah city limit in winter 1992. Many advisory speed signs are posted along the alignment with cautionary speeds of 30, 35 and 40 mph.

Design Speeds

The roadway design speeds for the study area are typically governed by the horizontal curves and range from 30 to 80 mph. Many of the curves are below current design standards. The curves that do not meet current design standards are indicated by an X marked next to the appropriate curve in the table below. Design speed is 50 mph per AASHTO and WSDOT standards for minor arterials with posted speeds of 40 mph.

Table 3a
Vertical Curves

From M.P.	To M.P.	Design Speed	Substandard Under Prior 1993 Posted Speed of 50 mph	Substandard Under Current Posted Speed of 40 mph
14.28	14.32	30	X	X
14.47	14.57	60		
14.80	14.86	30	X	X
14.94	14.98	45	X	X
15.24	15.30	30	X	X
15.44	15.46	30	X	X
15.70	15.72	30	X	X
15.78	15.86	50	X	
15.89	15.95	30	X	X
16.04	16.08	50	X	
16.16	16.18	30	X	X
16.21	16.31	60		
16.31	16.41	30	X	X
16.46	16.52	50'	X	
16.61	16.65	60		
16.67	16.69	30	X	X
16.90	16.96	30	X	X
17.00	17.08	80		
17.23	17.25	80		
17.35	17.37	60		
17.40	17.41	80		
17.42	17.50	30	X	X
17.60	17.62	35	X	X
17.74	17.75	80		
17.85	17.93	30	X	X
17.99	18.05	50	X	
18.15	18.16	80		
18.21	18.31	80		
18.42	18.43	8-		
18.58	18.64	55	X	
18.81	18.85	30	X	X
18.93	18.99	45	X	X
19.06	19.10	30	X	X
19.22	19.24	65		
19.38	19.40	50	X	
19.45	19.47	30	X	X
19.54	19.56	80		
19.96	19.63	80		
19.83	19.84	60		
19.99	20.03	35	X	X
20.05	20.11	30	X	X
20.16	20.20	60		
20.29	20.31	70		
20.47	20.49	70		
20.57	20.58	80		
20.61	20.62	80		
20.72	20.73	80		
20.91	20.97	80		
21.07	21.08	45	X	X
21.11	21.12	45	X	X
21.16	21.18	80		

21.25	21.27	80		

Table 3b
Horizontal Curves

From M.P.	To M.P.	Design Speed	Substandard Under Prior 1993 Posted Speed of 50 mph	Substandard Under Current Posted Speed of 40 mph
14.28	14.33	40	X	X
14.49	14.55	40	X	X
14.68	14.72	40	X	X
14.72	14.85	35	X	X
15.07	15.18	45	X	XX
15.34	15.38	40	X	X
15.39	15.44	40	X	X
15.48	15.56	40	X	X
15.71	15.76	40	X	X
16.05	16.10	40	X	X
16.16	16.26	45	X	X
16.65	16.71	40	X	X
16.95	16.98	50	X	
17.17	17.21	30	X	X
17.43	17.48	35	X	X
17.69	17.76	40	X	X
17.97	18.07	50	X	X
18.32	18.39	40	X	X
18.54	18.57	50	X	
18.82	18.86	40	X	X
18.99	19.02	40	X	X
19.16	19.20	40	X	X
19.34	19.43	35	X	X
19.51	19.60	35	X	.X
19.63	19.67	45	.X	X
19.78	19.85	45	X	X
19.85	19.93	35	X	X
19.94	19.99	45	X	X
20.27	20.32	45	X	X
21.02	21.04	45	X	X
21.11	21.22	50	X	

Terrain

The terrain is rolling from the Renton city limits to the May Valley Road intersection. This section contains grades of up to 4% with grades on most of the sections no greater than 1.5%. From the May Valley Road intersection north, the route runs uphill for about 1.5 miles and then continuously slopes downward to Issaquah. The upward section has a maximum grade of 4.5 % and the section down to Issaquah is an approximate 5% grade.

Bridges and Structures

There is currently one bridge (bridge number 900 129 from MP 21.00 to MP 21.01) on SR 900 at its crossing of Tibbetts Creek, just south of Newport Way in Issaquah. This structure was built in 1975 and is a two lane single span concrete structure, 29 feet long and 40 feet wide. A copy of the bridge condition report is provided in Appendix F. There are also a number of culverts on the route including the May Creek crossing just west of the intersection of SR 900 and May Valley Road.

Intersections and Interchanges

The majority of the roads intersecting SR 900 are controlled by stop signs. Table 4 lists each non-driveway intersection on the alignment, the type of intersection, and the intersection jurisdictional location.

Table 4a
SR 900 Traffic Controlled Intersections

Intersection	Type	Jurisdictional Location
Duvall Avenue NE	Signalized	Renton
Field Avenue NE	Minor Street Stop Controlled "T"	Renton
142nd Avenue SE	Minor Street Stop Controlled"T"	Renton
148th Avenue SE	Minor Street Stop Controlled	King Co.
150th Avenue SE	Minor Street Stop Controlled"T"	King Co.
151st Avenue SE	Minor Street Stop Controlled"T"	King Co.
162nd Avenue SE	Minor Street Stop Controlled	King Co.
164th Avenue SE	Minor Street Stop Controlled	King Co.
SE May Valley Rd.	Minor Street Stop Controlled	King Co.
SE Newport Way	Signalized	Issaquah
NW Mall Street	Minor Street Stop Controlled	Issaquah
Gilman Boulevard	Signalized	Issaquah

Table 4b
SR 900 Minor Intersections

Intersection	Type	Location
151stAvenue SE	Unsigned Minor Street Stop*.	Renton
144th Avenue SE	Unsigned Minor Street Stop*.	King Co.
146th Avenue SE	Unsigned Minor Street Stop*.	King Co.
161st Avenue SE	Unsigned Minor Street Stop*.	King Co.
163rd Avenue SE	Unsigned Minor Street Stop*.	King Co.
185th Avenue SE	Unsigned Minor Street Stop*.	King Co.
SE 98th Place	Unsigned Minor Street Stop*.	King Co.
SE 83rd Place	Unsigned Minor Street Stop*.	King Co.
SE 82nd Place	Unsigned Minor Street Stop*.	King Co.
SE 78th Street	Unsigned Minor Street Stop*.	King Co.
SE 75th Place	Unsigned Minor Street Stop*.	King Co.

* Although not signed, minor street traffic must stop per RCWs before entering major street (SR 900)

Intersection Geometrics

Unsignalized

All of the stop-controlled intersections are simple one-lane approaches in all directions with the following exceptions. The eastbound approach of Field Avenue NE consists of a separate through lane and a left-turn only lane. The westbound approach of 142nd Avenue SE consists of a separate through lane and a left-turn only lane. The northbound approach of 164th Avenue SE consists of a separate through lane and right-turn only lane. This right-turn lane connects to an acceleration lane. The northbound approach to SE May Valley Road consists of a separate through lane and right-turn only lane.

Intersection Lane Geometry

Unsignalized Intersections

All of the stop-controlled intersections do not have added turning lanes except at Field Avenue SE and 142nd Avenue SE. Field Avenue SE contains an eastbound left-turn lane and 142nd Avenue SE has a westbound left-turn lane.

Signalized Intersections

Along this project alignment, there are currently three signalized intersections; Gilman Boulevard, SE Newport Way, and Duvall Avenue SE. The first two intersections are located in Issaquah, and the third is located in Renton.

SR-900 at Gilman Boulevard

The northbound and southbound approaches both consist of two through lanes and a left-turn lane. The eastbound and westbound approaches consist of one through lane and one right-turn only lane.

SR-900 at SE Newport Way

The northbound and southbound approaches both consist of one through lane, a left-turn lane, and a right-turn lane. The eastbound and westbound approaches both consist of one through lane and a right-turn lane.

SR-900 at Duvall Avenue SE

All approaches of this intersection consist of two through lanes and a left-turn lane.

Level of Service at Signalized Intersections

Gilman Boulevard and SE Newport Wary

A previous study performed by Entranco Engineers (1992) identified both Gilman Boulevard and SE Newport Way as operating at level of service (LOS) D. This study was based upon turning movement counts collected in March 1992. The analysis used the 1985 Highway Capacity Manual (HCM) methodology. Average overall intersection delay was calculated to be approximately 30 seconds per vehicle.

Duvall Avenue SE

Intersection level of service at Duvall Avenue was calculated using turning movement counts collected in March 1992 by the City of Renton traffic department, based on 1985 HCM methodology. This intersection is currently operating at LOS C, with an average overall delay of approximately 30 seconds per vehicle.

Interchanges

The I-90 Issaquah Area Access Study (Parsons, Brinckerhoff, Quade and Douglas) determined that the SR 900/I-90 interchange may have future capacity problems. The report recommends, as a short-term improvement, signalizing the I-90 westbound off ramp and widening the eastbound ramp to four lanes. Other major recommended capital investments included improving the interchange to a full access interchange.

3.3 Zoning, Land Use, and Environmental Elements

Existing Zoning and Land Use

Most of the seven-mile route traverses unincorporated King County and is subject to King County plans, policies and land use regulations. The Newcastle Community Plan (1981) is the primary King County land use planning document for the SR 900 area. The study area along SR 900 includes Urban, Rural (Squawk Mountain vicinity), and Open Space (upper reaches of May Creek river valley) designations per the King County Comprehensive Plan (1985). Land uses in the Urban-designated area consist primarily of residential, small-scale agricultural uses, some convenience commercial, and neighborhood business uses (see Figure 3).

Within Renton city limits, land uses along SR 900 include single-family with some multi-family and commercial uses at the SR 900/Duvall Avenue SE intersection. Beyond Renton city limits towards Coalfield, single-family homes are located north of SR 900 on a relatively steep downward slope leading to May Creek. Where SR 900 cuts into the hillside, the south side of the road is relatively undeveloped with dense clusters- of trees; the north side is largely developed with single-family homes.

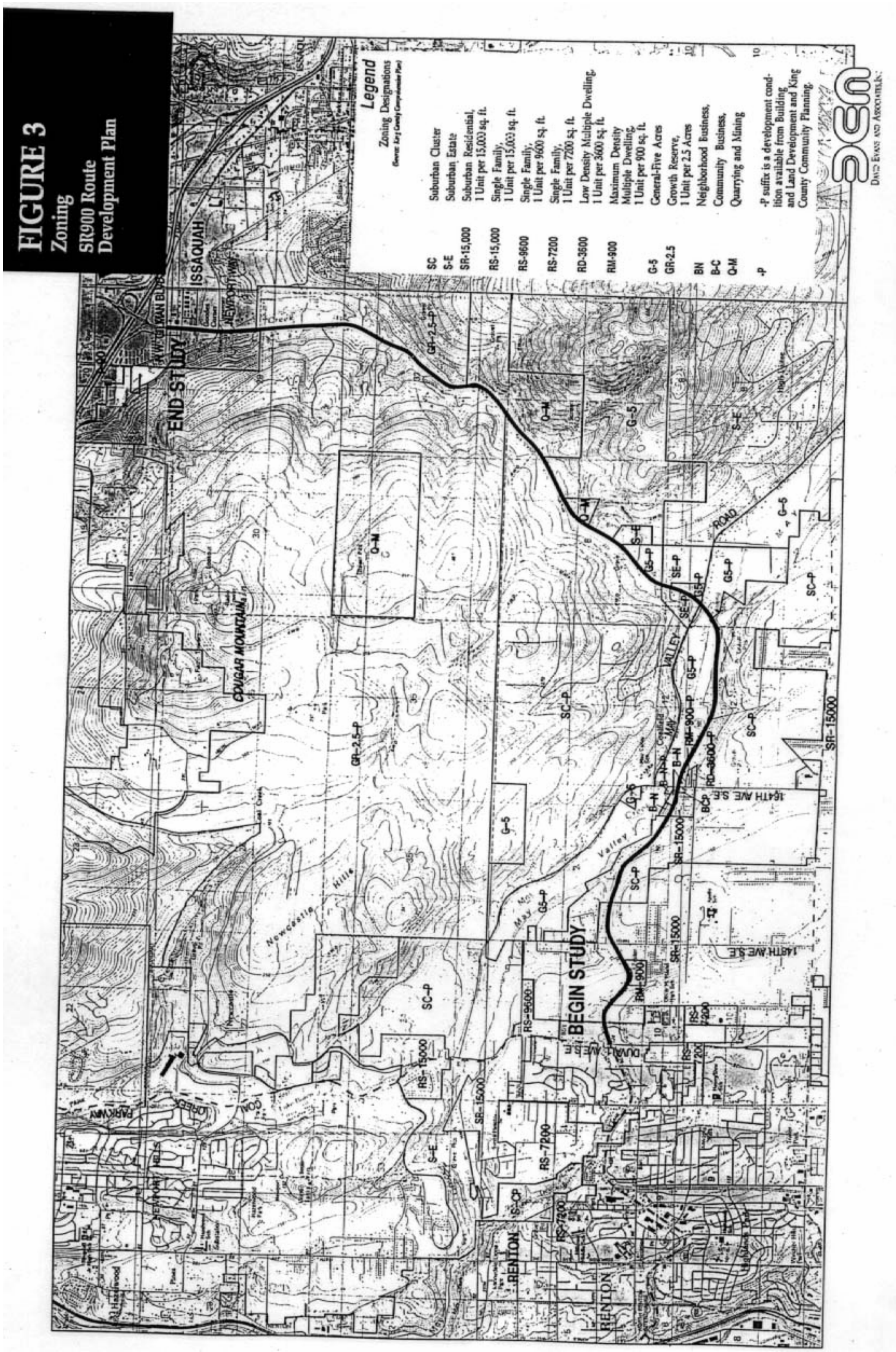


FIGURE 3
Zoning
SR900 Route Development Plan

Land uses in the vicinity of Coalfield, near the intersection of SR 900 and 164th Avenue SE, include neighborhood businesses and commercial uses, a gas station, a restaurant/tavern, a King County Fire station, and several unoccupied buildings. Single-family residential uses with associated agricultural uses (stables, ranches, hobby farms) are the predominant land uses in the May Valley.

SR 900 cuts through a deep, wooded bedrock canyon formed in the saddle between Cougar and Squawk Mountains. Several quarries, a campground, and scattered single-family homes are located on the western slope of Squawk Mountain. Single-family homes and trails are interspersed along winding private roads in the woods on the slope of Cougar Mountain. Several proposed and existing trailheads are located along SR 900. The Wilderness Creek Trailhead is located to the west of SR 900 at approximately Milepost 18.

Toward Issaquah, land uses include single family residential interspersed with stables, various agricultural uses, and a campground. Within the Issaquah city limits, land uses along SR 900 include nurseries and single-family residential. The Municipality of Metropolitan Seattle (METRO) also operates a Park-and-Ride lot at the northeast corner of SR 900 and Newport Way.

Figure 3 illustrates zoning in the study area. From the Renton city limits to May Valley Road, zoning along SR 900 is generally single-family residential (SR 15000, SC-P); neighborhood and community business at Coalfield (BN, BCP); and General (G-5, G-5-P). General-5 has the intent of providing an area-wide rural character. Multifamily zoning (RM 900) exists south of SR 900 near the Renton city limits.

From May Valley Road to the Issaquah city limits, zoning along SR 900 includes Suburban Estate (S-E, SE-P), allowing uses and activities more rural in nature; Quarry and Mining (QM); General-5 (G-5); and Growth Reserve (GR-2.5) allowing one dwelling unit per 2.5 acres. The GR-2.5 zone is designed to preserve large tracts of land, prevent premature urban development in areas without adequate public facilities, and maintain rural character.

Most of the SR 900 study route is in unincorporated King County. Within King County, property along the highway is subject to King County plans, policies and land use regulations. Issaquah has several planning documents prepared in consultation with King County plans, that address planning and development within its sphere of influence. Renton is currently preparing

the Final Interim Draft Land Use Element of their comprehensive plan, scheduled for completion in Spring 1993, which would address planning and development within its sphere of influence.

King County

King County's 1985 *Comprehensive Plan* provides- a land use concept and accompanying policies that articulate a general framework for managing growth, guiding development to appropriate areas, protecting environmental resources and coordinating public services and facilities. The comprehensive plan is the principal portion of the County's three-part planning system. Community plans develop detailed land use and capital improvement plans for local subareas of King County. Functional plans provide detailed programs and standards for providing public services and facilities. The *King County Comprehensive Plan* defines five types of planning areas: Urban, Rural, Transitional, Resource Lands, and Open Space. The SR 900 study area includes Urban, Rural (Squawk Mountain vicinity) and Open Space (upper reaches of May Creek river valley) designations, as shown on Figure 4.

Urban areas are committed to urban development and are designated for a variety of intensive land uses and activities. Parts of Cougar Mountain and areas within Issaquah's and Renton's sphere of influence are designated Urban.

Rural areas are characterized by significant environmental constraints, farming and forestry uses, low density development, and limited public services. Squawk Mountain and the upper reaches of the May Creek river valley are designated Rural.

Areas designated as Open Space include existing public park and recreation areas, scenic areas, and environmentally sensitive areas protected by regulations. Cougar Mountain Regional Wildland Park and the upper reaches of the May Creek river valley are designated Open Space.

The majority of the SR 900 study area is located within the King County's Newcastle Community Planning area. One of the major elements of the *Newcastle Community Plan* (1981) is the potential development of two master-planned villages in the Cougar Mountain Subarea compatible with the establishment of Cougar Mountain Regional Park, now well underway. Each village would have a mix of single and multifamily housing, neighborhood

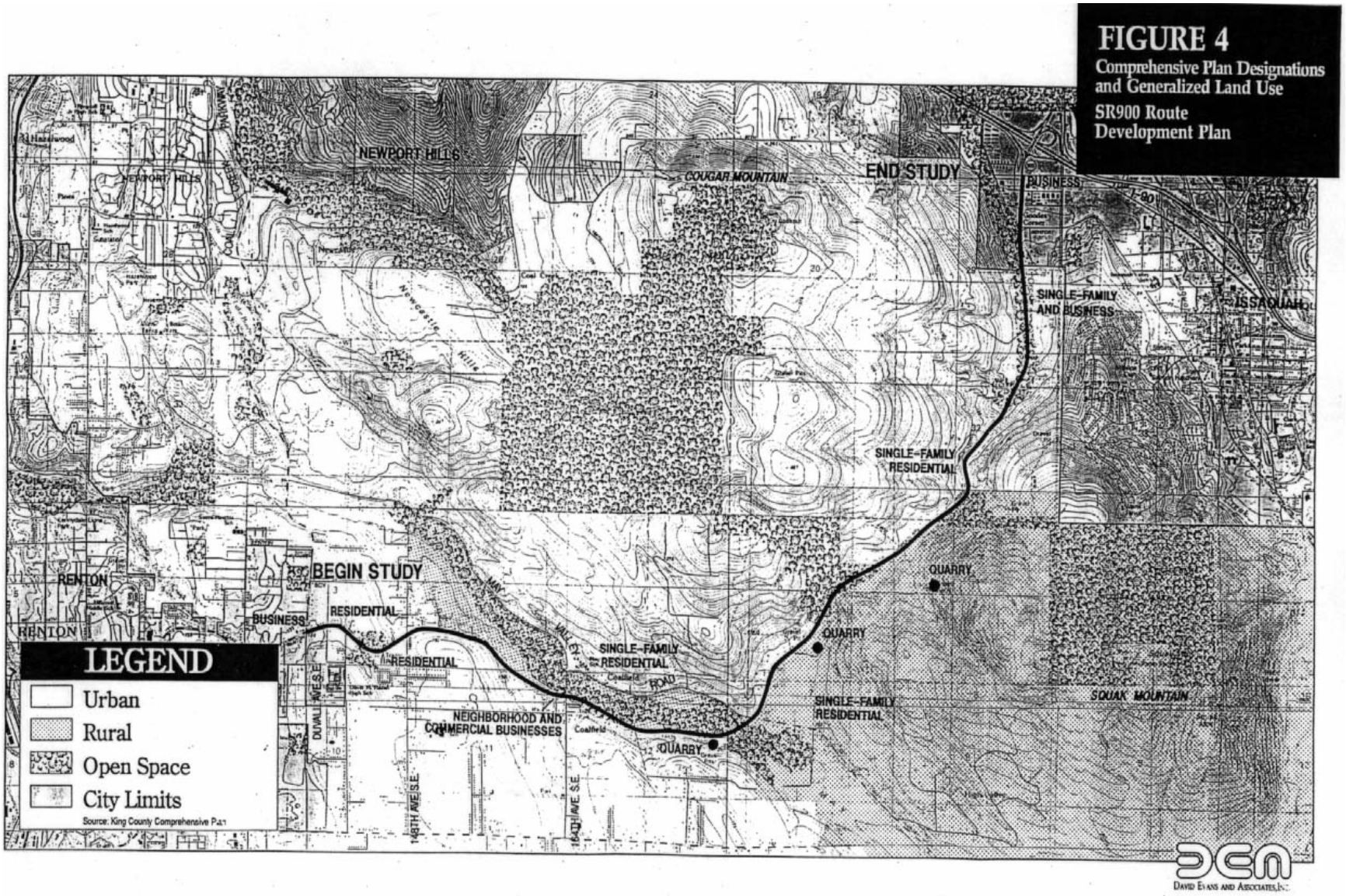


FIGURE 4
Comprehensive Plan Designations and Generalized Land Use
SR900 Route Development Plan
NEWPORT HILLS
COUGAR MOUNTAIN
END STUDY
BUSINESS
I-90
SINGLE-FAMILY AND BUSINESS
ISSAQUAH
SINGLE-FAMILY RESIDENTIAL
RENTON
BEGIN STUDY
BUSINESS
RESIDENTIAL
RESIDENTIAL
SINGLE-FAMILY RESIDENTIAL
QUARRY
QUARRY
SQUAK MOUNTAIN
SINGLE-FAMILY RESIDENTIAL
NEIGHBORHOOD AND COMMERCIAL BUSINESSES
QUARRY
Coalfield
ROAD
MAY VALLEY
DUVALL AVE S.E.
148TH AVE S.E.
164TH AVE S.E.
LEGEND
Urban
Rural
Open Space
City Limits
Source: King County Comprehensive Plan
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shopping and required public facilities. The Newcastle area zoning adopted concurrently with the plan supports the master planned village concept.

Growth Management Act

The 1990 Growth Management Act (GMA) requires the designation of Urban and Rural Growth Areas. Along SR 900, areas north of the highway were redesignated from urban to rural. These newly designated rural lands are based on the King County Countywide Planning Policies. Other designations along the roadway remain the same as those in the 1985 Comprehensive Plan. This new rural designation will result in the continuation of low population and housing density in those areas.

City of Issaquah

The City of Issaquah is currently updating its *Comprehensive Plan* originally developed in the early 1970s. SR 900 traverses the Tibbetts-East Cougar (TEC) Subarea, largely located in unincorporated King County. Issaquah's policy is to "actively pursue annexation of the unincorporated portions of the subarea in order to manage development."

Issaquah's *TEC Subarea Plan* (1990) allows development of a master-planned village consistent with the village concept proposed in the *Newcastle Plan*. The master-planned "village" must be at least 500 acres and conform to the village development policies and guidelines found in the *TEC Subarea Plan*. If a village is not proposed, development is allowed in accord with the objectives and policies in the *TEC Subarea Plan*. A village in the Lower Bench Subarea would have potential secondary access to and from SR 900, although primary arterial access would be focused towards Newport Way. The connection to Newport Way would accommodate approximately two-thirds of the external average weekday daily traffic, and the connections to SR 900 would accommodate the remaining traffic.

Renton

The City of Renton is currently preparing the final interim *Land Use Element* scheduled for completion in Spring 1993. This document will provide policy direction for the other elements of the updated *Renton Comprehensive Plan* as mandated by the State Growth Management Act. Renton envisions that the study area along SR 900 within its sphere of influence would remain rural in character.

Wetland, Flood Plains, Geological Hazards and Aquifers

The route has a number of areas which may be of environmental concern. The *King County Sensitive Areas Map Folio* (1990) identifies areas prone to landslide hazards and erosion hazards. Landslide hazard areas occur a half mile and one mile south of the SR 900/Newport Way intersection. Erosion hazards exist one half mile south of the SR 900/Newport Way intersection, on both sides of the highway; in the Tibbetts Valley near the drainage divide, on both sides of the highway; in the vicinity of the quarry south of May Valley Road, on the south side of the highway; and just east of the Renton city limits, on both sides of the highway.

Flood Hazard Areas were identified and mapped using Flood Insurance Rate maps produced by the Federal Emergency Management Agency (FEMA, 1989). Tibbetts Creek has about one mile of flood hazard area along its channel. May Creek has approximately two miles of mapped flood hazard areas close to SR 900. The *May Creek* and *Tibbetts Creek Basin Plans*, as well as the *King County Sensitive Areas Ordinance*, address activities in flood hazard areas.

Wetlands were surveyed as part of the SR 900 Design Analysis study. The study area contains extensive wetlands. The largest and most prominent wetlands are located along and associated with May and Tibbetts Creeks. The May Creek wetland complex is within the floodplain-of May Valley, along the north side of SR 900, at about 164th Avenue SE eastward to the intersection of SR 900 and May Valley Road. At this point May Creek crosses the highway. The May Creek wetland system continues on the eastern side of SR 900 to its headwaters. Other wetlands are isolated and vary in size and type. These wetlands consist primarily of forested and scrub/shrub vegetation, or a combination thereof. Several small farm ponds and emergent wetlands were also identified. Large, wet pastures may exist along the east side of SR 900 near SE 75th Street, but wetland delineation of this area would be required to determine tine' presence and extent of wetlands.

No known aquifer problems exist along the route.

3.4 Urban Sections

Only short sections of the study route are located within the boundary of a city and can be considered urban. About 1.1 miles of the route are within Issaquah city limits and 0.4 in Renton city limits.

The Renton end of the route has no special characteristics which could greatly be influenced by urban traffic. The roadway transitions between the more developed section of SR 900 (out of the route development study area) and the rural sections of the route. There are no sole-source aquifers next to or crossed by this section of SR 900.

SR 900's role in the urban road network is as a link between urban portions of the regional roadway system. Traffic on SR 900 will be influenced by the growth of urban areas and by the ability of SR 900 to serve as a connection to the urban street network. The function of SR 900 as a feeder to urban streets is notably a concern for the City of Renton. A number of the intersections to the east of the study route, within the City of Renton, are congested. The future use of SR 900 will have an impact on these urban intersections; additional capacity on SR 900 will add trips and potentially increase congestion at these intersections. SR 900 potentially could have similar impact on the streets in Issaquah. However, most of the intersections in Issaquah have greater reserve capacity. Issaquah is planning a new intersection at NW Maple Street and a possible cul-de-sac at SE Newport Way. This change will not greatly influence travel on the urban sections of SR 900.

The broader, longer term relationship between urban areas and SR 900 is addressed in the *Puget Sound Regional Council's Vision 2020* (1990). This document, which is the long-range growth and transportation strategy for the Central Puget Sound Region, shows SR 9001ocated within the Urban/Rural growth boundary. Within this boundary, the Cities of Issaquah and Renton's Central Business District are candidate Subregional Centers. A Subregional Center is expected to have high levels of employment, commercial activity, and a significant connection to the highway system. SR 900, as a connection between two centers of this level, is expected to experience increased traffic and more urban travelers. This additional demand is recognized in *Vision 2020*; the document proposes that SR 900 be widened to add general purpose vehicle capacity. The route, however, does not include any *Vision 2020* recommended transit or ride-sharing improvements.

Transportation System Management

In Issaquah, SR 900 meets I-90 at a diamond interchange. Ramp metering is currently being installed at this interchange. This will impact commuters who are sensitive to ramp metering backups and may cause some to seek alternative access routes to I-90.

Utilities

Utilities in the urban section of the route are typical of those found in urban areas within King County. In the rural section, a major overhead electrical power transmission line exists at approximately MP 19.4 where it crosses SR 900.

Interchanges and Intersections

Interchanges and intersections are discussed in Section 3.2.

Railroads

There are no railroads in the route development study area.

Park and Ride Lots

There is one Park-and-Ride lot in the study area at the intersection of SR 900 and Newport Way in the City of Issaquah. In addition, Metro operates a Park-and-Ride lot located in Renton to the west of the study area. The Park-and-Ride lots are discussed in Section 4.2.

Airports

There are no airports in the route development study area.

SECTION 4. CURRENT OPERATING CONDITIONS

4.1 Traffic

Existing annual average daily traffic (AADT) and PM peak hour (the evening commute) traffic volume data was collected for SR 900 and major adjacent roadways. The sources of information include:

- *Washington' State Department of Transportation Annual Traffic Report*, 1990
- Intersection Traffic Counts for SE 164th Street/SR 900, May Valley Road/SR 900, (WSDOT) (Average Daily Traffic only)
- City of Issaquah
- City of Renton
- King County Historical Traffic Counts, 1980 - 1990

Figure 5 summarizes the AADT on the route in 1990. Within the City of Renton, the AADT is approximately 18,000. To the east, between Duvall Avenue SE and 148th Avenue SE, the volumes decrease to 10,000 vehicles a day. Between 148th Avenue SE and May Valley Road, the volume averages between 7,000 and 8,000 AADT. Between May Valley Road and Issaquah, the traffic volume is approximately 9,000 AADT. Within the City of Issaquah, traffic on SR 900 ranges from 10,000 to 14,000 AADT. The higher levels of traffic on each end of the alignment reflects the increased density of development at those locations.

Most of the county roadways which intersect with SR 900 carry lower volumes than SR 900. Exceptions are SE Newport Way with approximately 15,000 AADT and Coal Creek Parkway with 14,000 AADT.

Where roadway PM peak hour volumes were not available, average daily traffic on SR 900 was converted to PM peak hour volumes by applying a 9 percent AADT to PM peak hour conversion factor.

The level of service analysis represents an evaluation of roadway traffic volumes and operations characteristics. The result is a description of a street's ability to successfully carry the traffic imposed on it. Level of service ranges from LOS A to LOS F. Table 5 describes the traffic operations associated with each level of service.

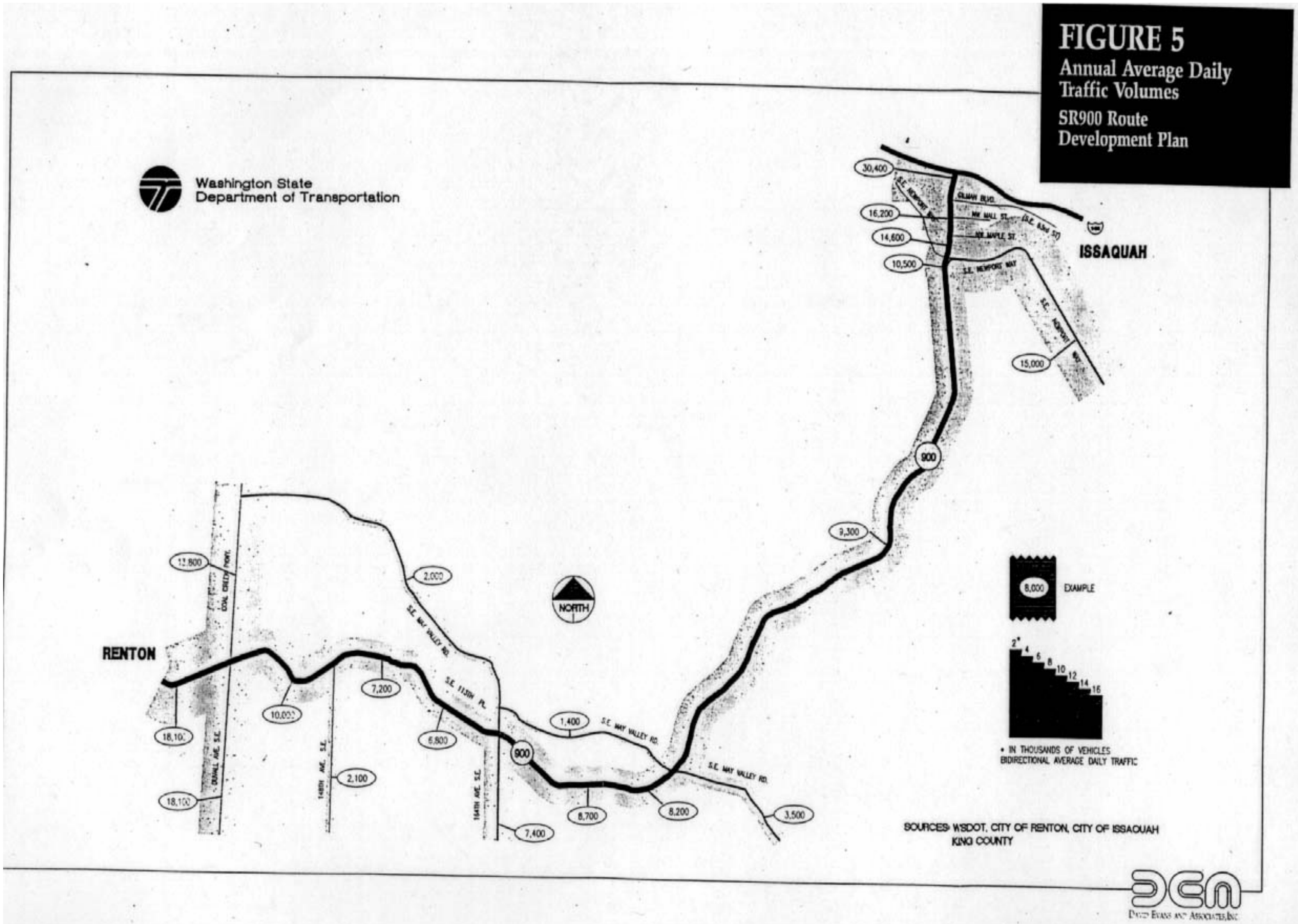

FIGURE 5
Annual Average Daily Traffic Volumes
SR900 Route Development Plan

Table 5

PM Peak hour Level of Service (LOS) Criteria

Level of Service	Description of Traffic Flow
A	Free-flow conditions
B	Free-flow but presence of other vehicles noticeable
C	Influence of traffic density on operation becomes marked
D	Speed and ability to maneuver are severely restricted because of traffic congestion
E	Operation is at or near capacity and is quite unstable. Any disruption may cause traffic to deteriorate to LOS F
F	Forced or breakdown rates with stop and go traffic

Three representative sections of the route were examined to determine traffic operations and capacity. The SR 900 sections are:

- East of Duvall Avenue,
- East of 164th Avenue SE, and
- North of SE May Valley Road.

The sections were selected because they represented both urban and rural portions of the study route.

Level of service (LOS) analysis for the two-lane section of SR 900 was performed using the 1985 *Highway Capacity Manual* (HCM) methodology for two-lane highways. The calculated volume to capacity (v/c) ratios for several locations along the route were compared to HCM's level of service (Table 8-l). The values used from the table correspond to rolling terrain and 100 percent no-passing zones. The terrain of this route is consistent with the HCM definition for rolling terrain and most of this route is striped for no passing; thus, a conservative value of 100 percent as passing zones was used. Comparing the computed v/c values to the HCM table values results in a corresponding LOS measurement.

Table 6
Existing PM Peak Hour Volumes and Level of Service

SR 900 Segment	Type of Section	Existing (1990) Volumes (VPH)	Volume to Capacity Ratio	LOS
East of Duvall Avenue	Two-lane highway	648	0.36	D
East of 164th Avenue SE	Two-lane highway	414	0.23	C
North of SE May Valley Road	Two-lane highway	738	0.41	D

Truck Percentages

Traffic classification data were acquired from the WSDOT's Traffic Systems Management Center (TSMC) for SR 900 at SE May Valley Road. The data were obtained from tube counts conducted during the month of February in 1992. These data indicate that truck percentages, including buses, average about 5 percent in both directions at this location.

4.2 System Enhancements

Transit

The only transit service on the study route is located on the 1 mile section between the SR 900/I-90 interchange and the Municipality of Metropolitan Seattle (Metro) Park-and-Ride lot at the northeast corner of SR 900 and Newport Way. The Metro routes which use this section of roadway are 210, 211, 213, 246, 268, and 271.

Downtown Renton is served by a Park-and-Ride lot west of the study area. Metro routes 107, 108, 109, 240, 245, 247, and 340 serve this lot.

SR 900 is also used by school buses from the Renton and Issaquah school districts. On the end of the route near Renton, 10 to 12 buses per day in the morning, and fewer than 10 per day in the evening, use SR 900. Since the bus service is to Hazen High School, the routes only use SR 900 between Renton and 142nd Avenue SE. In Issaquah, the buses use SR 900 between the Newport Park-and-Ride and 144th Avenue SE. In that section there are no more than 3 buses per day in the morning and afternoon periods.

There are no pull-outs designed specifically for bus use along SR 900.

Bicycle/Pedestrian Facilities

The majority of the study route does not meet Class II bikeway standards (WSDOT, Design -: Manual, Facilities for Nonmotorized Transportation, Section 1020). This classification also requires that a minimum of 4 feet of shoulder width be met. The Class II bikeway is a shared roadway which is not designated with signs and/or pavement marking but is accessible to bicyclists. SR 900 sees low levels of use by bicyclists.

SR 900, except where a bicycle lane might be built in the more densely developed areas, will - be a Class II Bikeway, based on the RDP.

Because much of the route is rural, without sidewalks and is relatively narrow, pedestrian use of SR 900 is limited. There is more pedestrian traffic at each end of the route and around 164th Avenue SE where there is a greater level of development and pedestrian ways are present.

4.4 Accidents Rates

A summary of reported accidents on the route for the period January 1988 to December 1991 is shown in Table 7, below.

Table 7
Accident Summary*
SR 900 (MP 14.20 to MP 21.39) Duvall Avenue to I-90

Accident Type	1988		1989		1990		1991	
Single Vehicle	41	(44%)	37	(35%)	36	(31%)	39	(36%)
Opposite Direction, Head-on	9	(10%)	11	(10%)	11	(10%)	8	(07%)
Left turning	9	(10%)	8	(07%)	8	(07%)	4	(04%)
Entering from side street/driveway	18	(20%)	34	(32%)	30	(26%)	6	(34%)
Wildlife	2	(01%)	1	(01%)	1	(01%)	4	(04%)
Rear-end	14	(15%)	6	(15%)	29	(25%)	16	(15%)
Total Accidents (Fatal Accidents)	93	(1)	107	(0)	15	(3)	107	(3)
Accidents/MVM (Based on ADT Estimates)	4.9		5.5		5.3		4.7	
Fatal Accidents/100 MVM	5.3		0.0		13.8		13.2	

*Source: WSDOT

As shown in Table 7, the number of reported accidents per year rose from 1988 to 1990, and seems to be leveling off in 1991. The number of accidents per million vehicle miles (MVM) is used to compare accident rates when the traffic volumes differ. Since traffic volumes have steadily increased since 1988, the rate of accidents per MVM has gone down to a level less than 1988 rates, even though accident occurrence has increased each year. The accidents per MVM can be misleading, especially on SR 900 because many minor single-vehicle accidents go unreported. These rates remain double the state-wide average of 2.3 accidents per MVM for similar WSDOT facilities.

Single-vehicle accidents on SR 900 involve vehicles that leave the road and strike man-made fixed objects, such as utility poles and guardrail (40 percent of occurrence), or strike embankments or ditches adjacent the road (33 percent of occurrence). The most frequent type of accident occurring in the study area is the single-vehicle accident. This reflects the roadways non-standard geometry and narrow shoulders, which makes it more difficult than typical to stay on the road. Twenty (20) percent of the single-vehicle accidents were overturn accidents that are attributable to cross-section super elevations inadequate to allow travel above the posted advisory speed. The remaining single-vehicle accidents involved vehicles striking wild and domestic animals and only few pedestrian/cyclist accidents (3 total).

The roadway was reviewed to determine if man-placed objects could be moved or protected and

if ditches or embankments could be regraded or protected to reduce the incidence and seventy of single car accidents. In the majority of the alignment, the steep side slopes (in both cut and fill) and narrow shoulder recovery area limit the effectiveness of removal or protection of fixed objects. For example, utility poles might be moved, but the steep cut and fill slopes remain. Or a ditch may be protected with guardrail, but the guardrail reduces the already narrow shoulder recovery area. The single-vehicle accidents occur throughout the alignment -- no one location or area shows a significantly higher occurrence than any other. In terms of roadway improvements, only a complete road improvement including shoulder widening, removal of nonstandard curves and regrading to improve non-standard super elevation would produce meaningful decreases in single-vehicle accidents. However, the recent change in the posted speed limit from 50 mph to 40 mph may result in a reduced accident ratio. The high rate of accidents also reflects the high rate of alcohol-related accidents, which at 23 percent is well above the 15 percent state-wide average.

WSDOT maintains a record of road segments under their jurisdiction that exhibit higher than average accident experience. The following locations in the study area are identified in the 1992 *Priority Array High Accident Locations* (HAL):

MP 16.12 to MP 16.20 - SR 900 at 164th Avenue SE intersection
MP 21.33 to MP 21.42 - SR 900 at Mail Street/Gilman Blvd. intersection

The HAL SR 900/164th Avenue SE intersection is scheduled to be signalized, which should reduce the number of accidents. The accident experience at the HAL intersection of SR 900/Mall Street/Gilman Blvd. would be alleviated when the City of Issaquah's Maple Street project is completed (estimated in 1996) which would divert traffic from Gilman Blvd.

Two additional locations had relatively high accident experience. These locations do not appear on the HAL because the accident rate is not high relative to state-wide experience. However, other than the two HAL's listed above, these locations have the most recorded accidents in the study area:

MP 16.5 to 17.5 -	SR 900 at May Valley Road (and approaches)
MP 19.5 to 20.1 -	The reverse curves located approximately 3/4 of a mile south of the City of Issaquah.

As for the entire study area, the most common type of accident at these two locations were single-vehicle accidents.

4.5 Six Year Plan Improvements

WSDOT maintains a six year transportation improvement program. To develop this program, many departmental divisions propose projects for the next six years based on needs within their section. These projects are prioritized based on, first, maintaining the existing system and, then, adding capital improvements. The proposed program is then presented to the legislature, which through, they may approve the entire program, funds only the first two years. This means that' through the projects listed below are on the six year plan, they may not be funded for design or construction, and the plan could change depending on newly identified needs. Updates to the plan occur every two months. The following list of projects indicates the current proposals for SR 900 per the *WSDOT District Project Development Status Report*, as of November 13, 1992.

Duvall Avenue to I-90 Design Study (Milepost 14.31 to 21.45).
This study, which was completed in October 1992, is a design analysis level examination of SR 900. The study reviewed both interim and long-term improvements to SR 900 A report was prepared to evaluate potential widening of the alignment and to determine the major design features and potential impacts of the widening.

Signalization at the intersection of SR 900 and 164th Avenue SE (Milepost 16.18 to 16.13).
The project's ad date is November, 1992. The intersection has been identified as a High Accident Location.

Duvall Avenue SE to SR 900 Widening (Milepost 14.31 to 21.64).
This project is to widen the existing roadway to 4 lanes. The ad date is October, 1996.

Improvement to the Intersection of SR 900 and SE May Valley Road (Milepost 17.10 to 17.8).
This project's ad date is May, 1991. The project involves channelization and new culverts.

Also listed in the six year plan are several projects on SR 900 in the vicinity of the SR 900/I-90 interchange. The projects are:

Richards Road Vicinity to Issaquah Creek (Milepost 10.54 to 18.11).

The ad date for this project is January, 1993. The project will resurface the existing roadway.

SR 405 to Issaquah HOV Lanes (Milepost 10.00 to 17.00).

The ad date is Fall, 2000. The project would construct east and west bound HOV lanes.

SECTION 5. ROUTE DEVELOPMENT PLAN

5.1 Comparison of Existing and Future Conditions

Historical traffic volume counts show that daily volumes on SR 900 have increased from 7,000 AADT in 1985 to 9,000 AADT in 1990 or approximately 4.5 percent per year. This rate of traffic growth is fairly typical of similar roadways in King County over the same period. However, the combination of that growth and the non-standard roadway geometry contribute to an accident rate far above the average for the state, and a higher than average number of alcohol-related and single-car accidents. 3-R improvements on SR 900 are justified to improve corridor safety and capacity improvements are also needed to serve the continued traffic growth expected in the future. This growth can be attributed both to general growth in the Puget Sound region as well as development along the SR 900 corridor which is allowed in the various comprehensive plans for the area. By the target year of 2010, without capacity improvements, the levels of service on SR 900 are forecast to drop to LOS E/F.

Beyond improvements to SR 900 for safety and capacity reasons, development as a 3-R project would be consistent with SR 900's classification as a Minor Arterial in the state highway network. One function of Minor Arterials is to form a rural network of arterial routes linking cities which generate travel with extensions into urban areas. With the growth of Issaquah and Renton as planned in *Vision 2020*, SR 900 will be an increasingly important roadway network connection between these areas. Overall, SR 900's role in the state roadway network will increase in importance, justifying 3-R improvements.

5.2 Improvement Alternatives Considered

The following is a brief description of the three design alternatives that were considered for this route, including a description of the advantages and disadvantages of each design. For more specific details about the different designs, refer to the *SR 900 Duvall Avenue to SR 90 Design Analysis Study*, prepared by David Evans and Associates.

Two-way Left-turn Lane Concept (Concept A

This concept includes widening of the roadway to five lanes. Sidewalk and bike lanes would be constructed on each side of the roadway in two locations: one section would be contiguous

with the urban section east of Renton, and second section would be constructed near 164th Ave. SE where the housing and commercial use density is higher than other locations on the corridor. Eight to ten-foot shoulders would be provided at all other locations on the alignment. The proposed posted speed limit would be 40 mph throughout the entire corridor. The *Design Manual* does not allow curbs in areas where the operating speed exceeds 40 mph. The concept A design speed is 50 mph. A design deviation would be required for the posted speeds and to allow curbs in the urban areas.

At locations on SR 900 where driveways and intersecting streets exist, the center turn lane would tend to contribute to efficient traffic operations. Vehicles making left-turns would be able to do so with minimal conflicts. The center turn lane would also improve the access for the driveways along the SR 900 corridor. The eight to ten-foot shoulders planned for this concept will contribute to driver security, provide a recovery area, reduce the negative slowing effects of roadside obstructions on driver behavior, and improve pedestrian and cyclist safety. The roadway sections with sidewalks and bike lanes will also help reduce the chance for pedestrian/bicycle and vehicle conflicts. The two-way left-turn lane makes it more difficult for access control measures to implemented, and, in the future, vehicle safety could be compromised if access is unrestricted.

Based on TMODEL2 output for the year 2010, this concept is expected to operate at LOS D to E in the PM peak hour. LOS E conditions would be encountered at each end of the alignment in the more urbanized areas. In addition, Concept A is projected to operate above capacity. The reduction of the speed limit from 50 mph to 40 mph will slightly reduce the capacity of the roadway in terms of vehicles per hour, but this reduction would not be significant in terms of total traffic carried and the operational efficiency of SR 900, and would tend to increase safety.

Median Barrier Concept (Concept B):

This is one of two 50 mph concepts for the long-term improvement of SR 900. WSDOT District 1 guidelines do not allow two-way left-turn lanes to be constructed on facilities with speeds of over 40 mph. This concept would widen the roadway to four lanes with a median barrier separating the two directions of travel. Left-turn and U-turn pockets would be limited to intersections and designated locations on the alignment. Eight to ten-foot shoulders would be provided. Sidewalk and bike lanes would be constructed in the section contiguous with the urban section in the City of Renton. The posted speed would be 50 mph except where the urban sections exist at each end of the project where the speed limit would be 35 mph. A design deviation would be required in the urban sections.

Operationally, the removal of left-turn access from the majority of the alignment except at roadway intersections and designated turning locations would result in a concentration of left-turns at those locations. In many cases, intersection operations may degrade to LOS F due to the high left and U-turn movements. The left-turn prohibition would affect the residences and businesses with direct access to SR 900 by restricting access to those properties. However, through volume capacity would be optimized.

Accident risk for Concept B as compared to Concept A is slightly lower. Preventing left-turns would reduce overall accident risk by reducing the risk of accidents involving left-turns. However, the increase in congestion at the locations where left-turns are allowed would result in an increase of rear-end accident risk. In addition, the median barrier would eliminate the risk of head-on accidents. However, left-turn and head-on accidents are not the most frequently occurring accident types in this corridor. The disadvantages of removing left-turns are not outweighed by the improvement in traffic safety due to a median barrier. Concept A would also reduce left-turn accident risk and would be very effective in reducing head-on accident risk. Head-on accident risk is reduced by improving the alignment, making it easier to stay in the proper travel lane, and by reducing the speed limit. Concept A also maintains full access to properties along SR 900.

Because the speed limit for Concept B is 50 mph, 10 mph greater than the proposed speed limit for Concept A, and because left turns are restricted to only a few locations on the alignment, Concept B's capacity is greater than Concept A's. The growth projections indicate that traffic demand will be so great that most arterials will operate at or near capacity in 2010. The

removal of left turns from the roadway would result in increased road segment level-of-service over Concept A, assuming the intersections are designed to accommodate the added left and U-turn demand created by the median barrier.

Unrestricted Access Median Concept (Concept C):

This is the second of two 50 mph concepts for the long-term improvement of SR 900. Under this concept, the roadway would be widened to four lanes with a four-foot paved area separating the two directions of travel. Left-turn pockets would be constructed at intersections. It would be legal to make a left-turn across the 4-foot paved median. As in Concept B. sidewalk and bikeways are proposed for the southernmost portion of the alignment. Eight- to ten-foot shoulders would be constructed on the majority of the roadway. The posted speed would be 50 mph except where the urban sections exist at each end of the project where the speed limit would be 35 mph. Concept C also evaluates a speed reduction alternative to reconstruct the curve located just north of the Renton city limits. The existing curve radius meets standards if the speed limit is reduced to 30 mph. A design deviation would be required in the urban sections.

Traffic capacity for Concept C would be nearly the same as for Concept A. Even though capacity under Concept C's 35/50 mph speed limit (versus a 35/40 mph speed limit for Concept A) would be greater, the absence of a left-turn lane would result in a decrease in through volume capacity due to left-turners blocking the through lanes while waiting to make left-turns.

The level-of-service for Concept C would be slightly lower than Concept A, based on a comparison of the volume to capacity ratios. The lower capacity of Concept C is due to the increased delay from left-turn vehicles in the through lanes.

Concept C would have a higher accident risk than Concept A for two reasons. First, the absence of the left-turn lane would increase the risk of rear-end accidents involving drivers waiting to make left-turns. Second, the risk of head-on collisions is higher under Concept C than Concept A because the recovery area is narrow (a 4-foot median versus a 13-foot left-turn lane) and the speed limit is higher.

5.3 Recommended Plan

SR 900 is a minor arterial recommended for improvements to 3-R standards. Much of the

roadway was built before modern design standards were in place. A 3-R project would widen SR 900 to a minimum of four lanes and widen the shoulders. The following table summarizes the design standards for 3-R projects both divided and undivided lane:

Table 8.
Minor Arterial 3-R Design Standards

Design Standard	Multi-Lane Divided	Multi-Lane Undivided
WSDOT Design Class	3-R-2	3-R-6
Current ADT	Over 4,000	Over 4,000
Functional Class	Minor Arterial	Minor Arterial
Design Speed	40 mph	40 mph
Traffic Lanes		
Number	4 or more	4 or more
Width	11 feet	11 feet
Parking Lanes/Urban	None	8 feet
Median Width		
Rural	Existing	4 feet
Urban	Existing	2 feet
Shoulder Width		
Right	6 feet	6 feet
Left	2 feet	6 feet

Selected Improvement Concept

Based on a review of the three improvement concepts above, a preferred improvement concept was selected. The concept - minor arterial 3R standards - is an aggregate of the three reviewed and would allow any of the three concepts - two-way left-turn lane, median barrier, or unrestricted access median. The determination of which section would be constructed along individual segments of SR 900 would depend on the traffic volume, the number of access points and their traffic volume, safety considerations, and adjacent land use. It is likely that the final roadway will comprise all three sections between Renton and Issaquah.

For the purposes of the this RDP, the level of service analyses were performed assuming implementation of Concept C. This concept represents the most conservative case of roadway capacity.

5.4 Target Level of Service

Traffic volumes on SR 900 and surrounding roadways for 2010 were obtained from a transportation model developed as part of a separate design analysis for SR 900 (David Evans and Associates, Inc. 1992). This model predicted traffic on SR 900 based on forecasted land use and population information as provided by the Puget Sound Regional Council (PSRC) as well as vehicle trip generation information provided by King County. The resulting traffic volumes reflect the PSRC anticipated regional growth pattern. The forecast PM peak hour traffic volumes for 2010 (assuming SR 900 is widened) are shown in Figure 6.

Based on the forecast volumes, SR 900 (widened to four lanes) would operate at LOS B to C as shown in Table 9 below.

Table 9
Forecast (2010) PM Peak Hour Volumes and Level of Service With Improvement

SR 900 Section	Type of Section	Forecast 2010 Volume (pcphpl)	Maximum Service Flow Rate for Corresponding LOS	LOS
East of Duvall Avenue to 164th Avenue SE	Multi-lane highway	900	1130	C :
164th Avenue SE to May Valley Road	Multi-lane highway	800	800	B
SE May Valley Road to Newport Way	Multi-lane highway	750	800	B

The future level of service measures were derived based on a four-lane, undivided highway with a posted speed limit of 40 mph. The multi-lane rural and suburban highways chapter (Chapter 7) of the HCM was used to determine level of service. The forecast 2010 two-way volumes were converted to volume per hour per lane based upon an anticipated 60/40 PM peak directional split. These volumes were then compared to the maximum service flow rates of Table 7-1 of HEM to obtain level of service. The comparison of flow rates must be made based on the appropriate free-flow speed. See Appendix A for the determination of the free-flow speed, extrapolation of service flow rates for this speed, and level of service calculations.

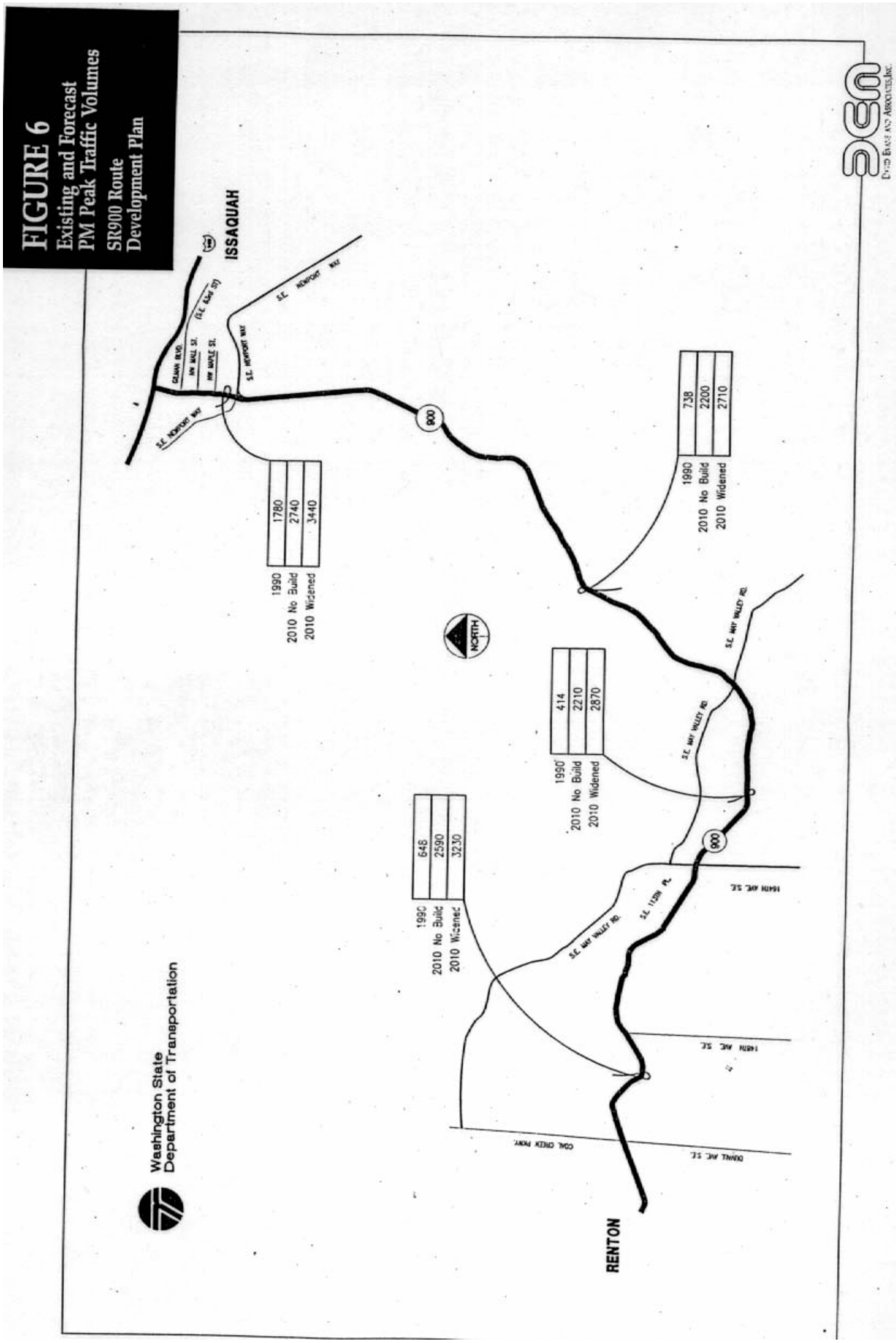
FIGURE 6
Existing and Forecast
PM Peak Traffic Volumes
SR900 Route
Development Plan
ISSAQUAH
RENTON
NORTH
900
1990 1780
2010 No Build 2740
2010 Widened 3440
1990 738
2010 No Build 2200
2010 Widened 2710
1990 414
2010 No Build 2210
2010 Widened 2870
1990 648
2010 No Build 2590
2010 Widened 3230
Washington State
Department of Transportation

5.5 Traffic Control

A number of short-term changes in traffic control are programmed for SR 900. The May Valley intersection is programmed to be rechannelized, the intersection of 164th Avenue SE to be signalized, and the City of Issaquah is planning to complete a new Maple Street one-way couplet. The widening of SR 900 will improve intersection operations by allowing the addition of turning lanes and would reduce congestion caused by vehicle turning movements.

5.6 Right-of-Way

Widening SR 900 from two to four lanes will require a substantial increase in right-of-way. Per WSDOT standards, the minimum right-of-way width is 80 feet in urban sections and 150 feet in rural sections. A maximum of 90 acres along the route would be required.

The right-of-way take could be reduced by obtaining slope and construction easements rather than purchasing right-of-way outright. In many locations, walls could be constructed to reduce the required right-of-way take.

5.7 Access Control

SR 900 is currently not programmed for establishment of any level of access control in the Access Control Plan. However, under RCW 47.50, WSDOT will soon be assigning access management classifications to the state routes in the whole state.

The expected classification for SR 900 will be aggressive in limiting access. The eventual level of access control adopted will recognize the need to preserve the functional integrity of the state highway system and promote efficient movement of traffic. Considerations for development of access control include:

- traffic volumes,
- accident rates,
- level of development and character of land along the route,
- location of intersections,
- alternative access, and
- opportunities for "U"-turns.

5.8 Channelization

Major revisions in channelization are not specifically recommended. Most major intersections are currently signalized and have turning lanes. The remaining major intersections are scheduled to be improved (May Valley Road, 164th Avenue SE) and these improvements will include channelization to add turning lanes as needed.

5.9 System Enhancements

Bicycle/Pedestrian Facilities

It is recommended that SR 900 remain a Class II bike facility. Features to improve bicyclist safety should be included throughout the route development. This includes 5-foot bike lanes on each side of the roadway. One section would be contiguous with the urban portions of the route near of Renton and a second section would be constructed near 164th Avenue SE where the housing and commercial density is higher than other locations on the route.

The development of SR 900 will increase pedestrian safety due to wider shoulders and the addition of sidewalks in some locations. Sidewalks are recommended at the same locations recommended for bike lanes due to the relatively high pedestrian activity, and other locations where feasible.

Transit Facilities

Due to the low level of transit use, specific improvements for transit are not recommended. At this time, Metro does not have any plans for future expansion of transit service in this area.

5.10 Constructability

The proposed improvement of SR 900 to meet current 3-R standards would require a variety of construction types and activities. Two of the major concerns are the need to excavate bedrock, which would require blasting, and the construction of fairly long retaining walls. In addition, it will be difficult to maintain current levels of traffic operations during construction. SR 900 is the most direct route connecting the Cities of Issaquah and Renton and there are no alternative

routes for traffic from parcels that have direct access onto SR 900. Therefore, it is important to consider the impacts of possible road closures and traffic detours.

Few actual road closures or detours would be required to widen SR 900. Construction sequencing will likely be conducted so that the new roadway section or a portion of that section, capable of handling two-way traffic, would be constructed first. Traffic would then be diverted to the newly constructed roadway while the existing roadway is removed and the remainder of the new roadway section is completed. The new Tibbetts Creek bridge would be constructed along a new alignment so staged construction will not be required. The existing Tibbetts Creek crossing just south of Newport Way in Issaquah, will be reconstructed in stages to allow continuous traffic.

Throughout construction, short-term disruptions to traffic would occur when construction operations encroach on the traveled way. Some of the adjacent properties may suffer temporary loss of access during construction.

Several areas may require blasting. Blasting will result in lengthy road closures where there is no existing detour or it is impossible to construct a detour route away from the blasting area. Since SR 900 is a direct route between Renton and Issaquah and alternative routes will require a significant detour, road closures should be publicized by signs posted on SR 900 prior to the closures, through the media, and through direct contact of those properties that would be affected the most. To reduce impacts to traffic, blasting should be restricted to off-peak periods when traffic volumes are at their lowest.

Construction of the improved SR 900 roadway will require extensive excavation and fills. Earth movement has the potential to disturb sensitive habitats. SR 900 is bordered by large areas of woodlands throughout much of the study area. Impacts to areas outside the actual construction zone must be minimized to protect sensitive areas. Equipment movement in woodlands should be restricted as much as possible.

Water quality should be protected during construction by preventing the intrusion of dirt, silt and other construction material into the surface water drainage systems and streams. Erosion and drainage control measures including fabric covers in cut areas and filtering of run-off would be required. This is especially important near streams that provide fish habitat. Construction schedules near these streams will be restricted to minimize impacts to fish.

The proposed widening and upgrading of the route should not prove to be too difficult except

in the few areas that will require blasting. Maintaining acceptable traffic operations will be most difficult in these areas due to the restrictions imposed by blasting. However, the remainder of the project areas will be constructed with traffic restrictions and delays typical to a project of this size.

SECTION 6. IMPLEMENTATION

This section is to be completed and reviewed separately and inserted when the RDP is ready for signature. It will consist of a definition of and planning level cost estimate for projects needed in the next six years, based upon this plan. Review of the implementation plan for SR 900 will occur as part of the State Transportation Improvement Plan (STIP) review process and normal project development reviews.

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